TVA Electric Vehicle Infrastructure

Tying together three metropolitan areas with a robust electric vehicle charging infrastructure has never been done before in the United States. Thanks to a partnership between the EV Project, TVA and many other stakeholders, this effort will soon take place on the largest geographic scale in the nation — in the heart of the Tennessee Valley. That means an entirely new way of thinking about electricity and a new role at the forefront of electric vehicle transportation for Tennessee.

The development of a dependable electric vehicle charging infrastructure in the Tennessee Valley is an important, long-term strategic focus for TVA. The introduction of electric vehicles will require a system of new solutions and approaches to the way electricity is delivered, distributed, monitored and used. TVA is fortunate to be in a position to leverage its engineering and advanced technology knowledge-base as well as a wide network of local power companies to help facilitate the introduction of electric vehicles in the Tennessee Valley and to share our lessons learned with communities throughout the nation.

The EV Project and TVA

The EV Project, in partnership with TVA and other stakeholders, will begin installing electric vehicle charging infrastructure this year that will give the Nashville-Knoxville-Chattanooga corridor the largest footprint of charging infrastructure in the nation and will serve as the EV Project's national pilot for connecting multiple metropolitan areas. The first wave will bring infrastructure to support 1,000 Nissan Leaf cars in Tennessee alone. That will mean more than 2,200 Level Two charging stations in homes and throughout communities in the Tennessee Valley and 60 Level Three fast charging stations — more than any other area in the nation.

The installation of this infrastructure, however, is only the beginning. Powering the infrastructure for 1,000 electric vehicles will fall to TVA and local power companies. It represents a tremendous opportunity for TVA and local power companies to take a national leadership role in learning from and improving electric vehicle charging systems as they gradually become part of our everyday experience.

TVA is working to help support the transition by focusing on:

- developing technologies to make the cars and the charging stations that fuel them work together efficiently.
- analyzing the new demands charging stations will place on the power grid.
- investigating ways, such as solar-assisted charging and distributed energy storage, to minimize demands on the grid and increase the use of renewable energy sources.
- refining existing processes for power system control to maximize energy efficiency and take full advantage of the environmental benefits of electric transportation.
- educating consumers and communities about what the transition to electric vehicles will mean for them.

SMART stations

To compliment the network the EV Project will bring to the Tennessee Valley, TVA has launched a solar charging station project with the Electric Power Research Institute, Oak Ridge National Laboratory, local power companies and a broad array of regional stakeholders.

The first prototype of these stations is called the Smart Modal Area Recharge Terminal, or SMART station. It will feature power generation by solar photovoltaic panels, stationary battery storage and key elements of smart grid technology.

TVA is planning 12 SMART stations over the next year that will provide a total of 125 charging spaces in the Nashville-Knoxville-Chattanooga corridor. The SMART station project will collect data on consumer usage patterns to help ascertain best practices and share lessons learned for additional deployment of electric vehicle infrastructure in the TVA region and throughout the nation.

TVA and the Electric Power Research Institute have made the technical design of the SMART station freely available for use by communities and organizations. We hope to see the best practices developed by this project replicated by others across the country.

Supporting TVA's vision

TVA's newly adopted strategic vision calls on TVA to lead the nation toward a cleaner energy future by relying more on nuclear power, continuing to improve air quality, relying less on coal and placing an emphasis on energy efficiency. TVA sees its investment in the evolution of electric vehicles as a key element that supports that strategic vision.

TVA is already examining how the switch from gasoline to electricity in transportation will support this new strategic direction. Electric vehicles present unique opportunities for true zero-emissions driving: the SMART station that TVA developed with EPRI for example, is solar assisted, allowing drivers to use renewable energy to fuel an electric vehicle – maximizing the potential of renewable energy and zero-emissions driving. And owners of electric vehicles who join TVA's Green Power Switch program can refuel at home while also supporting renewable energy sources.

Looking toward the future

Utilities, including TVA, have historically seen their generation capacity underutilized during off-peak hours (hours of low demand for electricity — mostly at night). This off-peak capacity means plenty of opportunity to provide electric fuel for transportation at higher efficiency and lower costs — a win for consumers, the environment, local distributors and TVA.

That's why TVA is working with local power companies to create a two-way communications system to fully integrate the consumer's need for power with TVA's ability to generate it. This approach — called 'smart charging' – will use technology to charge the vehicle at the best time for the environment, the consumer and entire electric grid. Most importantly, it provides the ideal opportunity to explore and understand a fully integrated smart grid system that makes the most of the environmental promise of electricity as a transportation fuel.